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ABSTRACT

This packet of technology learning activity (TLA) materials for residential construction for students in grades 6-10 consists of an instructor's section and student materials. The instructor's section contains background information, suggested activities, and a list of suggested resources. A lesson plan for the 10-day module includes assignments; equipment, tools, and supplies list; and facilities requirements/modifications. The following forms are provided: summary worksheet, pretest, posttest, test answers, and evaluation summary. A bibliography concludes the instructor's section. Topics are as follows: framing the subfloor, constructing exterior walls, constructing an interior wall, cutting ceiling joists and rafters, and completing a model home. The student section provides materials for each of the 10 days. The materials for the first day consist of the following: a summary of activities; list of all assignments in the TLA; goal; vocabulary with definitions; list of expected learner outcomes; list of objectives; list of related Technology Student Association competitive events; and academic and workplace applications reinforced by specific activities in this TLA. Materials for each of the other days may include some or all of the following: summary of activities; information sheet(s); objective with related introductory information; list of tools and materials; and procedure. (YLB)

ED 380 600

Technology Learning Activity

Technology Education Series

RESIDENTIAL CONSTRUCTION

TLA TE-1121

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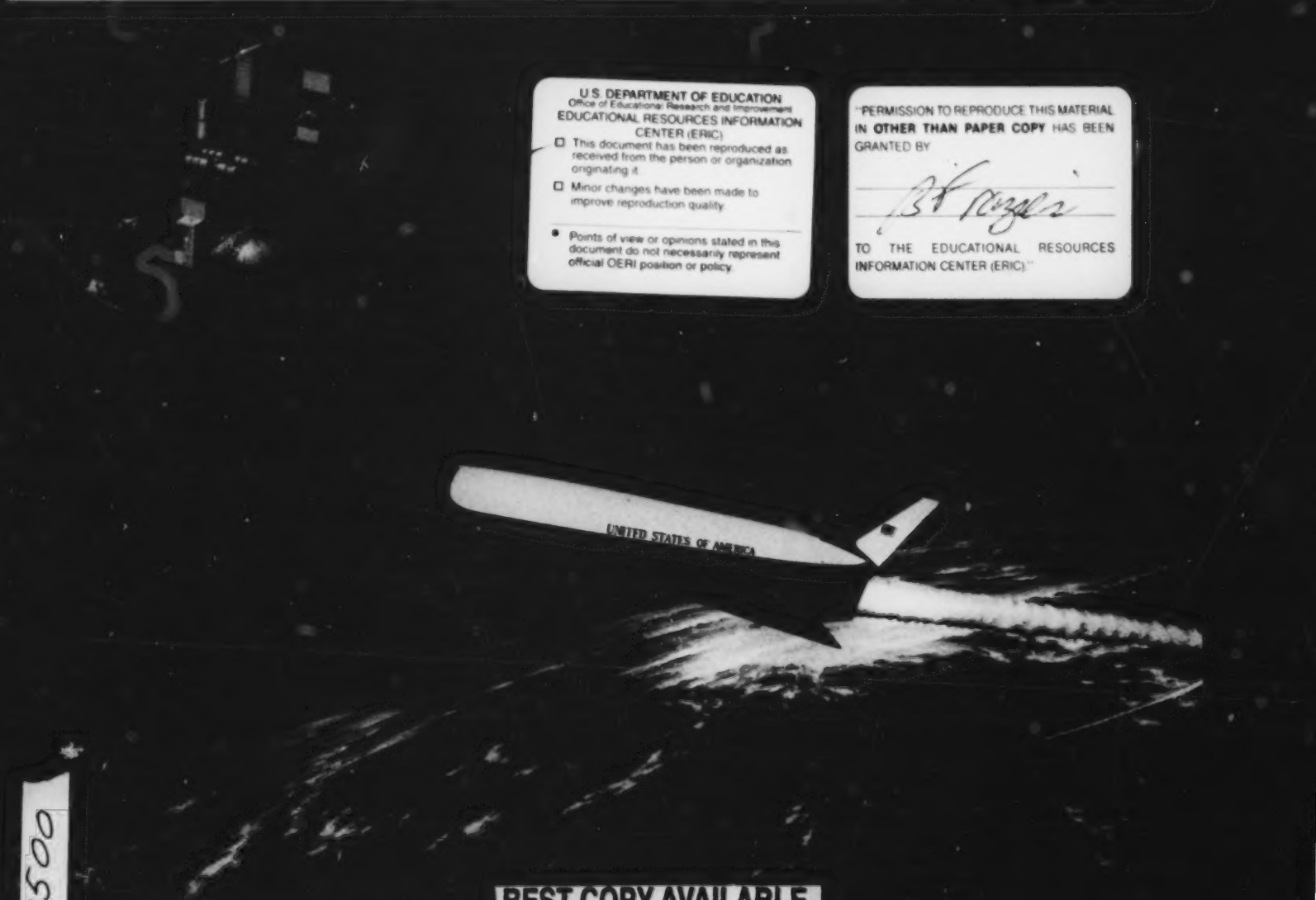

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ED 068500

CIMC

Teacher Edition

Oklahoma Department of Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074-4364

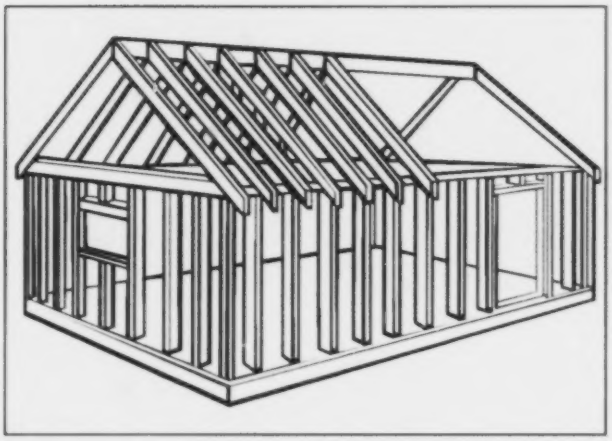
TECHNOLOGY EDUCATION

TECHNOLOGY LEARNING ACTIVITY

TE1121

RESIDENTIAL CONSTRUCTION

Suggested Time: 10 Days



Developed by the
Curriculum and Instructional Materials Center
for the Technology Education Division
Oklahoma Department of Vocational and Technical Education

94 010122

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Curriculum and Instructional Materials Center

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FOREWORD

What will be the careers of the future? The workforce of tomorrow will be shaped by the technologies being developed today. Students today need accurate, interesting information on growing technologies in order to make informed decisions about their futures.

It is our hope that this curriculum will help improve the quality of career decisions for our students. Students are introduced to a wide range of current, "cutting-edge" technologies and are encouraged to think critically about how those technologies influence their lives and futures. Today's students do not have to become the victims of "technological illiteracy," but instead can learn to anticipate technological developments and take positive steps to prepare for the future.

Technology Learning Activities provide students with the knowledge and an introduction to the skills they need for a positive learning and career experience. Every generation is faced with learning how to manage technological advances. Information gained through participation in the *Technology Education* program can help students develop a holistic view of technology on which to base their educational and career decisions.

Roy Peters, Jr., Ed.D., State Director
Oklahoma Department of
Vocational and Technical Education

Lynn Hawkins, State Supervisor
Technology Education
Oklahoma Department of
Vocational and Technical Education

PREFACE

We believe that one of the most effective ways to improve education is through the development and implementation of a sound instructional materials system. Technology Education instructional materials represent a new design for CIMC which recognizes the importance of graphic materials in the learning process.

Technology Education instructional materials are designed for 6th through 10th grade students. The design of these materials is based on current research on how people read and gain information from documents. The design is called "New Look" and integrates both graphics and text into a balanced presentation which is easy to use and follow.

Technology Education provides the student a look at what the world will be like in the future based on technologies in use and being developed today. Throughout the Technology Education instructional materials, the students are introduced to "cutting-edge" technologies that they will use and encounter in a working environment later in life. This exposure gives them a wide range of experiences on which to base career decisions.

This publication is intended as a starting point, from which the teacher can innovate, localize, and personalize in order to prepare students for their future. The *Technology Education* series of Technology Learning Activities was written with the realization that we are creating the workforce of tomorrow by how and what we teach about technology today.

Sherry Wietelman, M.S.Curriculum Development Specialist
Curriculum and Instructional Materials Center
Oklahoma Department of
Vocational and Technical Education

ACKNOWLEDGEMENTS

The Curriculum and Instructional Materials Center (CIMC) extends its appreciation to those individuals who played important roles in the development of Technology Learning Activity materials.

Generous thanks are extended to the teachers who tested this Technology Learning Activity (TLA) in the field.

Jim Harder and Kevin Terronez
Mayfield Junior High School

Robert Eubanks
Welch High School

George McCreary
Vinita High School

Oklahoma Department of Vocational and Technical Education Technology Education staff who provided leadership and direction on this project deserve special recognition.

Lynn Hawkins
State Supervisor
Technology Education

Donovan Bowers
Assistant State Supervisor
Technology Education

Harold Holley
Assistant State Supervisor
Technology Education

We also thank the State Director, Dr. Roy Peters, Jr., and the Assistant State Director, Dr. Charles O. Hopkins, for their continued support throughout this project.

Special recognition and gratitude is expressed to Michael Wilson who wrote, formatted, and produced the camera-ready copy and to Joey Parker who produced the illustrations. The floor, exterior wall, and roof framing illustrations were used with permission of Mid-America Vocational Curriculum Consortium.

Only through the close cooperation of the Curriculum and Instructional Materials Center staff was this curriculum developed. Sincere thanks are shared with the CIMC coordinators.

John Friedemann
CIMC Coordinator

Lynna Ausburn, Ph.D.
CIMC Development Coordinator

Special recognition and thanks are also extended to other individuals within the Oklahoma Department of Vocational and Technical Education (ODVTE) involved in the development and distribution process: Danny Darrow and staff at the ODVTE Print Shop; Bob Davis and staff artist Kathryn Moore for the cover design and Robert Randall for scanning graphics; and Darrel Stiles and his staff in the ODVTE Warehouse for packaging and coordinating transportation and distribution of these materials.

Finally, a big thank you to all ODVTE team members who offer their support on a daily basis in "behind-the-scenes" ways but never seem to be recognized for their contributions: Suzanne Perry and Terri Tomson, CIMC secretaries; Shirley Hill and Michelle Hensiek, Technology Education secretaries.

Sherry Wietelman, M.S.
Curriculum Development Specialist
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education

BACKGROUND INFORMATION

INSTRUCTOR'S SECTION

INTRODUCTION TO RESIDENTIAL CONSTRUCTION

Carpentry

Carpentry is a broad classification within the trades and industries concerned with the building of wooden structures. Carpentry involves the construction of industrial, commercial, and residential buildings and includes such work as the erection of concrete forms for bridges and super-highway overpasses.

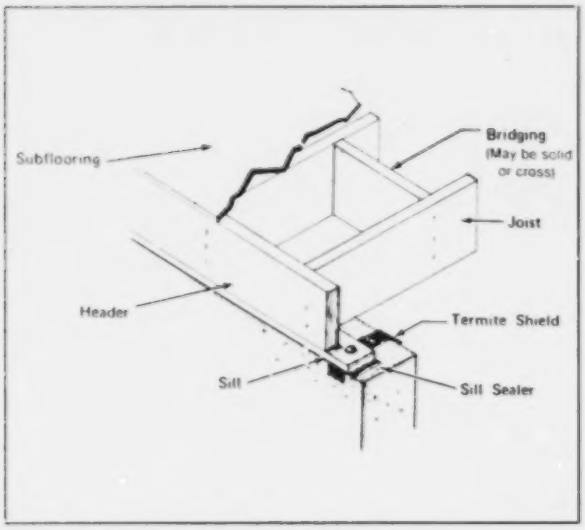
Carpenters must have a good understanding of wood and construction methods, and be able to lay sills and joists, erect studs and rafters, and apply sheathing, siding, and shingles. Carpenters should be competent at setting door jambs, hanging doors, applying wood trim, building stairs, and constructing cabinets. Because so many different skills are required, carpenters often specialize in either the area of rough construction (constructing floors, walls, and roofing) or finish work (carpentry done after the frame is complete).

Plans

As in all areas of woodworking, it is essential for the carpenter to have adequate plans to follow throughout the construction process. Architectural drawings consist of site layout, foundation plans, floor plans, front, right, and rear elevations, sectional views, detail drawings, and written specifications. Floor plans provide most of the dimensions needed to build a structure.

BACKGROUND INFORMATION

Adequate and properly installed foundations are essential to all types of wood structures. Footings are concrete slabs poured into the ground below the frost line. Foundation blocks are laid on top of the footing. Carpenters generally use cement blocks for foundation material; however, many homes are built on a concrete slab.



Floor framing members consist of sills, girders, headers, and joists (refer to the figure above). A subfloor is laid on top of the floor joists. The material used for the subfloor is usually particle board or plywood. The floor frame sets on top of the foundation. A poured concrete slab eliminates the floor framing stage of building a house. Thus many people use a cement foundation to cut costs and materials.

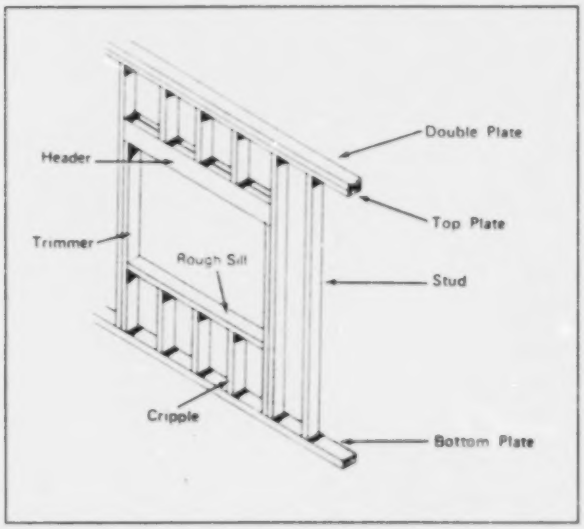
INSTRUCTOR'S SECTION

Foundations

Floor Framing

BACKGROUND INFORMATION

Ceiling frames consist of joists arranged somewhat like floor joists. Ceiling frames carry only the ceiling finish and do not support a second floor or the roof. 2" x 6" lumber is generally used for ceiling joists, which usually run across the narrow dimension of the structure.



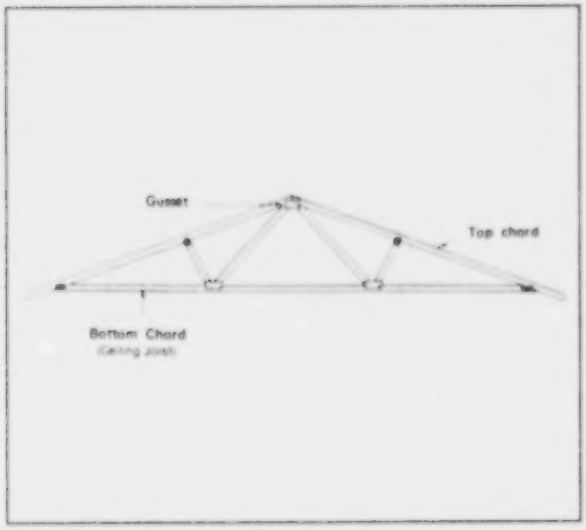
Standard wall framing members include sole plates (or bottom plates), top plates, studs, cripples, and headers. Studs and plates are made from 2" x 4" lumber, while headers usually require a heavier material. Wall frames are cut and assembled or partially assembled on the rough floor deck and then placed in an upright position. Most houses are constructed with the wall studs put on 16-inch centers.

INSTRUCTOR'S SECTION

Ceiling Frame

Exterior Wall Framing

BACKGROUND INFORMATION



When the ceiling frame is complete and the outside walls sheathed, the roof frame is constructed. There are many types of roof designs, such as flat, gable, butterfly, and hip. Roofs have supports called rafters. There are many ways to lay a rafter, and the carpenter's experience helps to decide which method to use. Many homes today use a truss system to replace the old rafter systems (see the figure above). Trusses can be made using smaller dimension woods, such as 2" x 4", rather than the 2" x 6" lumber required in conventional rafters. The bracing in the truss is what allows the smaller lumber to be used. Decking is added to the top of the 2" x 4" rafters. The decking usually consists of particle board, flake board or plywood. When shingles are applied to the top of the decking, the roof is complete.

INSTRUCTOR'S SECTION

Roof Frame

BACKGROUND INFORMATION

INSTRUCTOR'S SECTION

Exterior Finish

After windows and door frames are set and cased, an exterior finish consisting of cornice work, siding, and trim can be completed. A wide range of exterior wall finishing materials is available: plywood, composition board, hardboard, and beveled siding are a few.

Interior Finish

There are also many interior finishes from which to choose. Once the walls and roof are on, the plumbing, electrical, heating, interior wall and ceiling finish, stairs, interior doors, window trim, and cabinet work are put in place.

GUIDELINES FOR USING AN ARCHITECT'S SCALE

An architect's scale is generally multi-sided, and each side is marked with a different scale of measure. These scales use common fractions, such as ½ and ¼, as a unit of measure equal to 1 foot (1'-0") in length. For example, when you are drawing a building using the side of an architect's scale marked "¼", each ¼-inch used to draw a line equals 1 foot of the actual size of the building. There are 12 marks (graduations) to the right of 0. These graduations help you be more accurate when drawing with an architect's scale. Each of the 12 graduations on the ¼ scale equals 1 inch in actual building measurements (because there are 12 inches in 1 foot).

EXPECTED LEARNER OUTCOMES

- You will know and appreciate the importance of technology and technological literacy.
- You will explore career opportunities so you can make meaningful career choices.
- You will explore future educational opportunities so you can make meaningful educational choices.
- You will apply problem-solving and critical thinking techniques.
- You will apply math, science, reading and other school subjects in a practical situation.
- You will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- You will recognize and develop individual talents.
- You will think logically and sequentially.
- You will adjust to a changing technological environment.

— continued —

INSTRUCTOR'S SECTION

EXPECTED LEARNER OUTCOMES

- You will develop leadership, creative abilities, positive self-concepts, and individual potential in a technological society.
- You will become a more sophisticated consumer of goods and services of a technological society.
- You will develop an understanding of and the ability to adapt to those technological forces that influence life in the 21st Century.
- You will develop an understanding of economic development.
- You will communicate by making clear and relevant through the development of mental process skills.
- You will apply design, imagination, and creative abilities.
- You will learn applications of lifelong learning skills.
- You will think globally and act locally.
- You will explore the organization and management systems of business and industry.

INSTRUCTOR'S SECTION

SUGGESTED ACTIVITIES

- ✓ Obtain materials to supplement TLA.

See Suggested Resources for computer software and books to supplement this module.

- ✓ Review instructional outline for this TLA. Modify time frames to suit class needs and plan activities for each class period.
- ✓ Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- ✓ Determine scope and sequence of objectives that you add to the TLA. Design and develop support materials, including evaluation techniques, for additional objectives.
- ✓ Determine how you will schedule time for students to demonstrate competence in the required procedures.
- ✓ Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of this TLA.

INSTRUCTOR'S SECTION

PREPARATION

SUGGESTED RESOURCES

Hacker, Michael, and Robert Barden. *Living with Technology*. Delmar Publishers, Inc. Albany, NY, 1993.

Henak, Richard M. *Exploring Construction*. Goodheart-Wilcox, Inc. South Holland, IL, 1985.

INSTRUCTOR'S SECTION

WORKSTATION BOOKSHELF

Hacker, Michael, and Robert Barden. *Living with Technology*. Delmar Publishers, Inc. Albany, NY, 1993.

Henak, Richard M. *Exploring Construction*. Goodheart-Wilcox, Inc. South Holland, IL, 1985.

INSTRUCTOR'S REFERENCE MATERIALS

Instructional Sequence	Technology Education: Residential Construction		
	Assignments	**Equipment, Tools, and Supplies**	**Facilities Requirements/ Modifications**
Day 1	Take Pretest. Read Assignments to Turn In, Goal, Words You Should Know, Expected Learner Outcomes, Objectives, Related TSA Competitive Events, Academic and Workplace Applications.	Computer score card/sheet for Pretest #2 pencil	
Days 2-3	Read Information Sheet Complete Objective 1: Use the materials and procedure outlined below to frame the subfloor of a model home.	Architect's scale Pencil Miter box Band saw Scrap lumber Diagram for subfloor Hot glue gun and glue 1/8" x 10" x 14" piece of plywood or heavy cardboard Single-edge razor blade	
Day 4-5	Complete Objective 2: Use the materials and procedure outlined below to construct the walls for your model home according to the specifications of the diagram for exterior walls.	Architect's scale Pencil Miter box Band saw Scrap lumber Floor plan Diagram for exterior walls Hot glue gun and glue Single-edge razor blade	

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Instructional Sequence	Technology Education: Residential Construction		
	Assignments	**Equipment, Tools, and Supplies**	**Facilities Requirements/ Modifications**
Day 6-7	Complete Objective 3: Use the materials and procedure outlined below to construct an interior wall for your model according to the specifications of the diagram for the interior wall provided.	Architect's scale Pencil Miter box Band saw Scrap lumber Floor plan Diagram for interior walls T-assemblies (2) Hot glue gun and glue Single-edge razor blade	
Day 8-9	Complete Objective 4: Use the materials and procedure outlined below to cut ceiling joists and rafters according to the diagram for ceiling joists and rafters.	Architect's scale Pencil Miter box Band saw Scrap lumber Diagram for ceiling joists and rafters Hot glue gun and glue Single-edge razor blade	
Day 10	Complete Objective 5: Use the materials and procedure outlined below to complete your model home and prepare it for final grading by your instructor. Read Impact Statements Complete Career Search Activity, any Unfinished Assignments, Posttest Skunk Works (if time)	Single-edge razor Masking tape Ink pen Computer score card or sheet Notebook paper (2 sheets) #2 pencil	

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SUMMARY WORKSHEET

INSTRUCTOR'S SECTION

Equipment, Tools, and Supplies: Drafting
Summary Worksheet

Equipment, Tools, and Supplies	Per Student	Per Period	Total Needed	Special Considerations	Cost per Student	Cost per Period	Total Cost	Special Considerations
#2 pencil	1			Breakage				
Computer scan card/sheet	1			Mistakes				
Scrap lumber (optional)	enough to cut model pieces			Mistakes				
Model kit (optional)	1							
Miter Box (optional)	1							
Band saw (optional)	1							
Architect's scale	1							
Diagrams: subfloor, floor plan, interior walls, exterior walls, and ceiling.	1 set							
Heavy cardboard or plywood (1/8" x 10" x 14")	1 piece			Mistakes				
Single-edge razor	1			Mistakes				
Notebook paper	2			Mistakes				
Masking tape	1							
Ink pen	1							
Hot glue gun	1							
Glue	enough to make model							

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PRETEST

INSTRUCTOR'S SECTION

PART 1

1. The term "carpentry" is concerned with the building of:

   a. metal structures
   b. wooden structures
   c. both a and b
   d. none of the above

2. Which of the following job tasks would a rough-in carpenter **not** do in building a home?

   a. wall studs
   b. roof framing
   c. cabinet work
   d. floor framing

3. Which of the following architectural drawings provide most of the dimensions needed to build a structure?

   a. foundation plans
   b. site layout plans
   c. elevation plans
   d. floor plans

4. Which of the following is **not** a part of the floor frame?

   a. header
   b. sill
   c. trimmer
   d. joist

— continued —

PRETEST

INSTRUCTOR'S SECTION

PART 2

5. Which of the following is not a part of the wall frame?

   a. stud
   b. top plate
   c. cripple
   d. bridging

6. Which of the following is not a part of the truss system?

   a. gusset
   b. top cord
   c. bottom cord
   d. rough sill

7. When using a truss system, larger dimension lumber must be used to build the truss than in a conventional roof.

   a. True
   b. False

8. Which of the following materials may be used for an exterior finish?

   a. beveled siding
   b. composition boards
   c. hardboards
   d. all of the above

— continued —

PRETEST

INSTRUCTOR'S SECTION

PART 3

9. When constructing wall frames, you should usually use heavier material for headers than for studs and plates.

   a. True
   b. False

10. Which of the following job tasks are performed after the rough framing is completed?

    a. plumbing
    b. cabinet work
    c. electrical
    d. all of the above

POSTTEST

1. The term "carpentry" is concerned with the building of:

   a. metal structures
   b. wooden structures
   c. both a and b
   d. none of the above

2. Which of the following job tasks would a rough-in carpenter **not** do in building a home?

   a. wall studs
   b. roof framing
   c. cabinet work
   d. floor framing

3. Which of the following architectural drawings provide most of the dimensions needed to build a structure?

   a. foundation plans
   b. site layout plans
   c. elevation plans
   d. floor plans

4. Which of the following is **not** a part of the floor frame?

   a. header
   b. sill
   c. trimmer
   d. joist

INSTRUCTOR'S SECTION

PART 1

POSTTEST

INSTRUCTOR'S SECTION

PART 2

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   c. cripple
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   c. bottom cord
   d. rough sill

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POSTTEST

INSTRUCTOR'S SECTION

PART 3

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   a. True
   b. False

10. Which of the following job tasks are performed after the rough framing is completed?

    a. plumbing
    b. cabinet work
    c. electrical
    d. all of the above

POSTTEST

21. truss
22. fascia
23. termite shield
24. residintial
25. shingels
26. cornice
27. interior
28. rafter
29. joest
30. concret

INSTRUCTOR'S SECTION

SPELLING TEST

TEST ANSWERS

1. B
2. C
3. D
4. C
5. D

6. D
7. B
8. D
9. B
10. D

11. B
12. C
13. D
14. C
15. D

16. D
17. B
18. D
19. B
20. D

21. A
22. A
23. A
24. B
25. B

26. A
27. A
28. A
29. B
30. B

INSTRUCTOR'S SECTION

PRETEST ANSWERS

POSTTEST ANSWERS

TEST ANSWERS

10 POINTS EACH:

Pretest _____

15 POINTS EACH

Career Search _____

Objective 1: Frame the subfloor of a model home. _____

Objective 2: Construct the walls for the model home according to the specifications of the diagram for exterior walls. _____

Objective 3: Construct an interior wall for your model according to the specifications of the diagram for the interior wall provided. _____

Objective 4: Cut ceiling joists and rafters according to the diagram for ceiling joists and rafters. _____

Objective 5: Complete your model home and prepare it for grading by your instructor. _____

INSTRUCTOR'S SECTION

1. PROCESS EVALUATION

1. PROCESS EVALUATION SCORE _____

EVALUATION SUMMARY

The instructor is encouraged to individualize the TLA to address the specific needs of each student, considering age and ability level. In addition to the specific areas on the chart below, the instructor should take into account the student's desire, enthusiasm, etc.

Evaluation based upon observed performance = 40 possible points.

EVALUATION RATING TABLE

Student Name: _____

Criteria	Points Possible	Points Earned
Neatness	10	_____
Accuracy	20	_____
Completeness	10	_____

— continued —

INSTRUCTOR'S SECTION

2. PRODUCT EVALUATION

EVALUATION SUMMARY

Use the conversion table below to convert Product Evaluation scores to percentiles.

40 = 100%
39 = 97.5
38 = 95
37 = 92.5
36 = 90

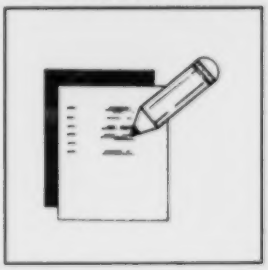
35 = 87.5
34 = 85
33 = 82.5
32 = 80

31 = 77.5
30 = 75
29 = 72.5
28 = 70

27 = 67.5
26 = 65
25 = 62.5
24 = 60

INSTRUCTOR'S SECTION

2. PRODUCT EVALUATION



CONVERSION TABLE

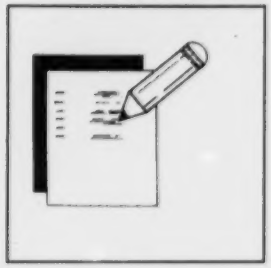
2. PRODUCT EVALUATION SCORE_____

EVALUATION SUMMARY

Posttest score = _____

INSTRUCTOR'S SECTION

3. WRITTEN EVALUATION



3. WRITTEN EVALUATION SCORE _____

EVALUATION WORKSHEET

1. Process evaluation score = _____
2. Product evaluation score = _____
3. Written evaluation score = _____
4. Total score = _____

Divide Total Score by 3 to find TLA score.

Total Score for TLA =

1 + 2 + 3 = Total Score

Total Score /3 = TLA SCORE

TLA SCORE _____

BIBLIOGRAPHY

Hacker, Michael, and Robert Barden. *Living with Technology*. Delmar Publishers, Inc. Albany, NY, 1993.

Henak, Richard M. *Exploring Construction*. Goodheart-Wilcox, Inc. South Holland, IL, 1985.

INSTRUCTOR'S SECTION

TECHNOLOGY EDUCATION

TECHNOLOGY

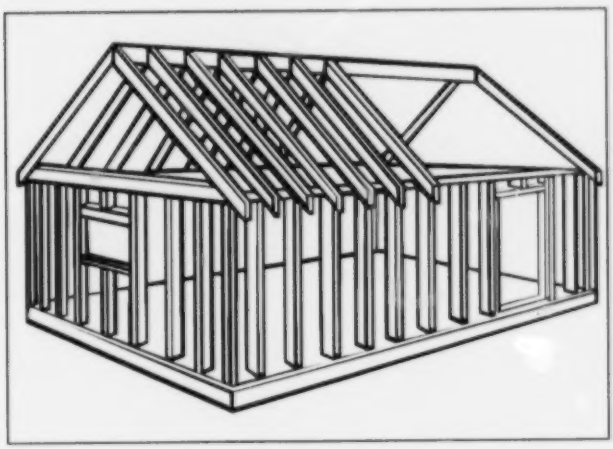
LEARNING

ACTIVITY

TE3121

RESIDENTIAL CONSTRUCTION

Suggested Time: 10 Days



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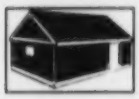
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES



On Day 1, complete the following activities:

1. Complete Pretest
2. Read Assignments to Turn In (items to complete in 10 days)
3. Read Goal
4. Read Words You Should Know
5. Read Expected Learner Outcomes
6. Read Objectives
7. Read Related TSA Competitive Events
8. Read Academic and Workplace Applications
9. Read Information Sheet

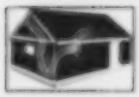
SUMMARY OF ACTIVITIES

Reading Comprehension Skills
- Gain factual information
- Make generalizations
- React to written material

Functional Reading Skills:
- Follow written instructions
- Interpret graphics and symbols

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES



PRETEST

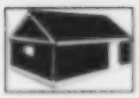
INSTRUCTIONS

You will need a computer scan sheet or card to record your answers to the following Pretest. Be sure to write your name, the title of the TLA, the date, and the class period on the computer scan sheet or card using a #2 pencil. Use rows 1-10 to record the answers to the Pretest. If your answers will be hand-scored, use a blank sheet of paper to record your answers and number your answers 1-10.

Get Pretest Questions from your instructor.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES



ASSIGNMENTS TO TURN IN

At the end of 10 days, you should give the following items to your instructor for evaluation:

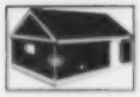
1. **Computer scan sheet or card with answers to:**

   a) Pretest
   b) Posttest
   c) Spelling Test

2. **A completed model with subfloor, exterior wall, interior wall, and roof frames constructed according to diagrams from your instructor.**

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES

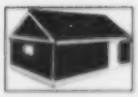


GOAL

Using the Residential Construction TLA, you will be able to use an architect's scale to measure and draw lines and be able to complete a scale model of a home. You will also develop a basic understanding of carpentry.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



WORDS YOU SHOULD KNOW

Girder — steel or wooden beam that runs the length of the floor and supports the floor frame.

Header — a board placed over doors and windows used to provide strength where the wall studs are missing.

Joist — provides a surface on which to lay the floor and attach the ceiling. Joists prevent the rafters from pushing the walls outward.

Plates — horizontal members at the top and bottom of a wall that hold the ends of studs in place.

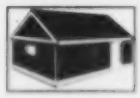
Rafter — member that extends from the top plate to the roof ridge and forms the roof support.

Sill — horizontal member at the bottom of a window frame that extends from one stud to the other. Also, a horizontal member placed on the foundation to provide a base for fastening the building frame to the foundation.

Stud — a board used to frame the walls.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



EXPECTED LEARNER OUTCOMES

- You will know and appreciate the importance of technology and technological literacy.
- You will explore career opportunities so you can make meaningful career choices.
- You will explore future educational opportunities so you can make meaningful educational choices.
- You will apply problem-solving and critical thinking techniques.
- You will apply math, science, reading and other school subjects in a practical situation.
- You will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- You will recognize and develop individual talents.
- You will think logically and sequentially.
- You will adjust to a changing technological environment.

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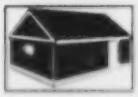
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



- You will develop leadership, creative abilities, positive self-concepts, and individual potential in a technological society.
- You will become a more sophisticated consumer of goods and services of a technological society.
- You will develop an understanding of and the ability to adapt to those technological forces that influence life in the 21st Century.
- You will develop an understanding of economic development.
- You will communicate by making clear and relevant through the development of mental process skills.
- You will apply design, imagination, and creative abilities.
- You will learn applications of lifelong learning skills.
- You will think globally and act locally.
- You will explore the organization and management systems of business and industry.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES

OBJECTIVES

At the end of this Technology Learning Activity, you should be able to:

1. Use the materials and the procedure outlined below to frame the subfloor of a model home.

2. Use the materials and the procedure outlined below to construct the walls for your model home according to the specifications of the diagram for exterior walls.

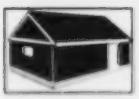
3. Use the materials and procedure outlined below to construct an interior wall for your model according to the specifications of the diagram for the interior wall provided.

4. Use the materials and the procedure outlined below to cut ceiling joists and rafters according to the diagram for ceiling joists and rafters.

5. Use the materials and the procedure outlined below to complete your model home and prepare it for final grading by your instructor.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



Related TSA Competitive Events

The following TSA Competitive Events apply to your study of residential construction:

- Construction Technology
- Technical Report Writing
- Research Paper
- Safety Poster
- Extemporaneous Speech
- Prepared Speech

See *TSA Curricular Resource Guide* for specific details on the competitions.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES

ACADEMIC AND WORKPLACE APPLICATION

Technology Education Courses are designed to provide a means through which you can apply other courses — such as Math, Science, English, and Social Studies — in a practical manner within a technology-base situation. Technology Education Courses give you the opportunity to apply academic and workplace skills that you may need to function in a technological society.

Even though each of the nine Academic and Workplace Application areas is applicable to Technology Education and the content of this TLA, the following areas are specifically reinforced:

Reading Skills Applied:

Reading Comprehension Skills:
- Gain factual information
- Make generalizations
- React to written material

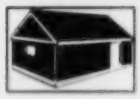
Functional Reading Skills:
- Follow written instructions
- Interpret graphics and symbols

Math Skills Applied:

Functional Math Skills:
- Make measurements

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



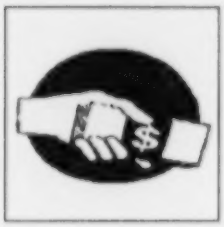
Employability Skills Applied:

Job Search/Selection Skills:

- Investigate requirements for a career field/occupation
- Compare evaluate career options

Job Acquisition/Development Skills:

- Master specific job task/procedure



TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES

INFORMATION SHEET

INTRODUCTION TO RESIDENTIAL CONSTRUCTION

Carpentry

Carpentry is a broad classification within the trades and industries concerned with the building of wooden structures. Carpentry involves the construction of industrial, commercial, and residential buildings and includes such work as the erection of concrete forms for bridges and super-highway overpasses.

Carpenters must have a good understanding of wood and construction methods, and be able to lay sills and joists, erect studs and rafters, and apply sheathing, siding, and shingles. Carpenters should be competent at setting door jambs, hanging doors, applying wood trim, building stairs, and constructing cabinets. Because so many different skills are required, carpenters often specialize in either the area of rough construction (constructing floors, walls, and roofing) or finish work (carpentry done after the frame is complete).

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES

Plans

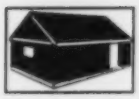
As in all areas of woodworking, it is essential for the carpenter to have adequate plans to follow throughout the construction process. Architectural drawings consist of site layout, foundation plans, floor plans, front, right, and rear elevations, sectional views, detail drawings, and written specifications. Floor plans provide most of the dimensions needed to build a structure.

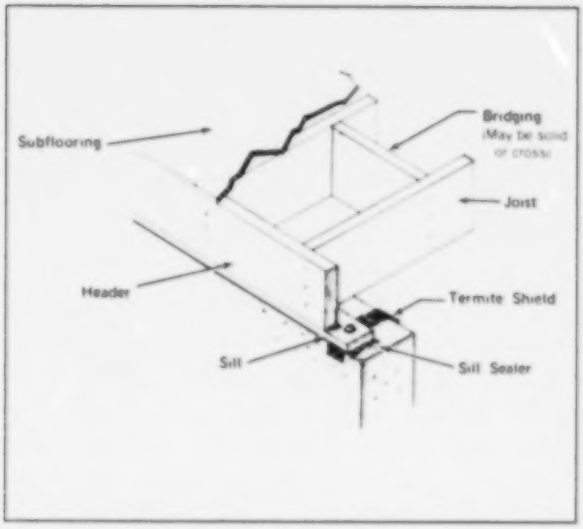
Foundations

Adequate and properly installed foundations are essential to all types of wood structures. Footings are concrete slabs poured into the ground below the frost line. Foundation blocks are laid on top of the footing. Carpenters generally use cement blocks for foundation material; however, many homes are built on a concrete slab.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES





Floor Framing

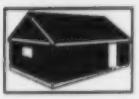
Floor framing members consist of sills, girders, and joists (refer to the figure above). A subfloor is laid on top of the floor joists. The material used for the subfloor is usually particle board or plywood. The floor frame sets on top of the foundation. A poured concrete slab eliminates the floor framing stage of building a house. Thus many people use a cement foundation to cut costs and materials.

Ceiling Frame

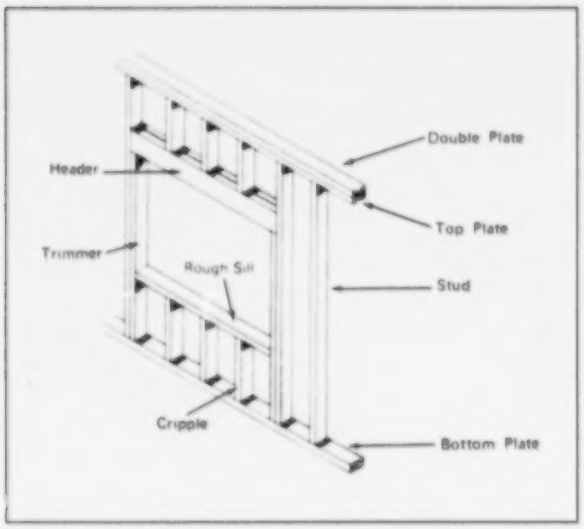
Ceiling frames consist of joists arranged somewhat like floor joists. Ceiling frames carry only the ceiling finish and do not support a second floor or the roof. 2" x 6" lumber is generally used for ceiling joists, which usually run across the narrow dimension of the structure.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



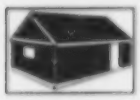
Exterior Wall Framing



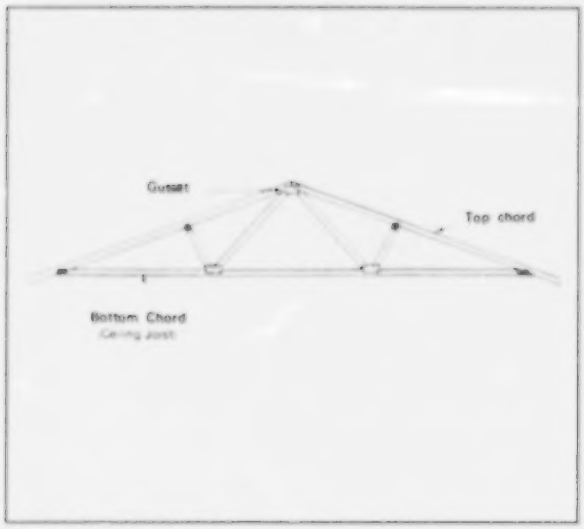
Standard wall framing members include sole plates (or bottom plates), top plates, studs, and headers. Studs and plates are made from 2" x 4" lumber, while headers usually require a heavier material. Wall frames are cut and assembled or partially assembled on the rough floor deck and then placed in an upright position. Most houses are constructed with the wall studs put on 16-inch centers.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1
ACTIVITIES



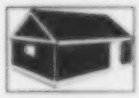
Roof Frame



When the ceiling frame is complete and the outside walls sheathed, the roof frame is constructed. There are many types of roof designs, such as flat, gable, butterfly, and hip. Roofs have supports called rafters. There are many ways to lay a rafter, and the carpenter's experience helps to decide which method to use. Many homes today use a truss system to replace the old rafter systems (see the figure above). Trusses can be made using smaller dimension woods such as 2" x 4" rather than the 2" x 6" lumber required in conventional rafters. The bracing in the truss is what allows the smaller lumber to be used. Decking is added to the top of the 2" x 4" rafters. The decking usually consists of particle board, flake board or plywood. When shingles are applied to the top of the decking, the roof is complete.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 1 ACTIVITIES



Exterior Finish

After windows and door frames are set and cased, an exterior finish consisting of cornice work, siding, and trim can be completed. A wide range of exterior wall finishing materials is available: plywood, composition board, hardboard, and beveled siding are a few.

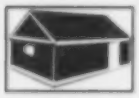
Interior Finish

There are also many interior finishes from which to choose. Once the walls and roof are on, the plumbing, electrical, heating, interior wall and ceiling finish, stairs, interior doors, window trim, and cabinet work are put in place.

In this TLA you will use many of the framing techniques mentioned in this introduction. You should be familiar with the parts of a floor frame, wall frame, and roof frame. If you are not sure you know what these parts are, go back and reread this introduction. If you do know the parts of those frames, then you may begin Days 2 and 3 Activities.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 2-3 ACTIVITIES



On Days 2-3, complete the following activities:

1. Read Information Sheet
2. Complete Objective 1

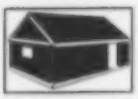
SUMMARY OF ACTIVITIES

Job Acquisition/Development Skills:

- Master specific job task/procedure

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

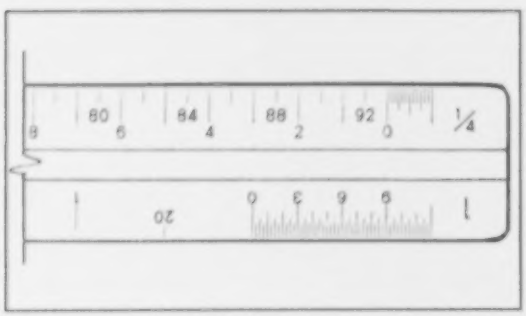
DAYS 2-3
ACTIVITIES



INFORMATION SHEET

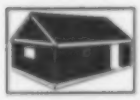
GUIDELINES FOR USING AN ARCHITECT'S SCALE

An architect's scale is generally multi-sided, and each side is marked with a different scale of measure. The figure below shows an example of an architectural scale. These scales use common fractions, such as ½ and ¼, as a unit of measure equal to 1 foot (1'-0") in length. For example, when you are drawing a building using the side of an architect's scale marked "¼", each ¼-inch used to draw a line equals 1 foot of the actual size of the building. If you look at the figure below, you will notice there are 12 marks (graduations) to the right of 0. These graduations help you be more accurate when drawing with an architectural scale. Each of the 12 graduations on the ¼ scale equals 1 inch in actual building measurements (because there are 12 inches in 1 foot).



TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

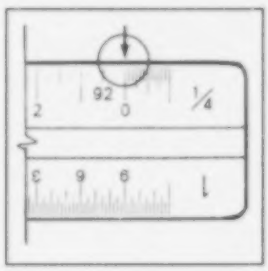
DAYS 2-3 ACTIVITIES



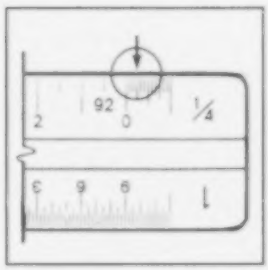
Use the steps below to learn how to draw an accurate line using both inch and foot graduations on a scale. In the following example you will use the ¼-inch scale to draw a line that represents 4'-3" in length.

EXAMPLE OF USING AN ARCHITECT'S SCALE

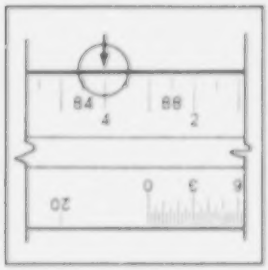
STEP 1: Locate the zero mark and the inch graduations to the right of the zero on the ¼ scale.



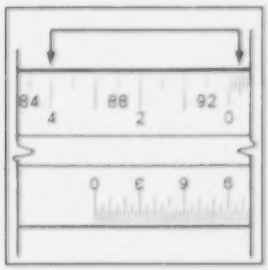
STEP 2: Count three graduations to the right of the zero to locate the graduation equalling 3 inches in actual length.



STEP 3: Locate the 4 to the left of the zero. This graduation represents 4 feet on the ¼-inch scale.

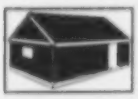


STEP 4: Place the scale on the drawing paper, and beginning at the 3-inch graduation to the right of the zero, complete a line that ends at the 4 foot graduation to the left of zero. You have completed a line representing 4'-3" on a ¼-inch scale.



TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 2-3 ACTIVITIES



OBJECTIVE 1

Use the materials and the procedure outlined below to frame the subfloor of a model home.

- Architect's scale
- Pencil
- Diagram for subfloor
- Hot glue gun and glue
- One 1/8" x 10" x 14" piece of plywood or heavy cardboard
- Single-edge razor blade

and

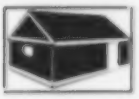
- Model kit

OR

- Miter box
- Band saw
- Scrap lumber

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 2-3 ACTIVITIES



PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Obtain the materials listed above.
NOTE: If you will be using a kit to construct your home, do not gather the lumber, miter box, or band saw. Skip to Step 3.

STEP 2: Ask your instructor if you may use the miter box and band saw to cut the lumber into the following pieces:
- 2 floor headers
- 22 floor joists

Measure the subfloor diagram for the dimensions of the pieces you will cut.

WARNING:
MOVING BLADE can cut off hand or fingers. OBSERVE ALL SAFETY RULES AND KEEP SAW GUARDS IN PLACE.

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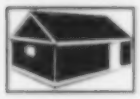
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 2-3 ACTIVITIES



FOLLOW THESE STEPS:

STEP 3: Plug the hot glue gun into a wall socket.

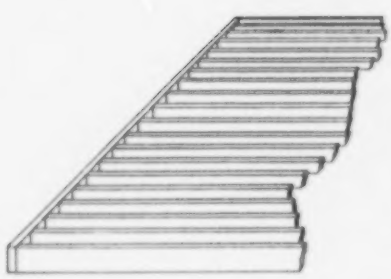
CAUTION:
BURN POSSIBLE: Glue is very hot.
DO NOT TOUCH HOT GLUE.

STEP 4: Lay the floor diagram flat on the table where you will work.

STEP 5: Lay the two floor headers flat and mark off the location of the floor joists with your pencil.

IMPORTANT:
Make your markings on the 3/4" x 14" pieces.

STEP 6: Glue the 22 floor joists crossways into the headers.



IMPORTANT:
Do not glue on the floor diagram. Move the pieces onto the table for gluing.

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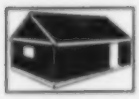
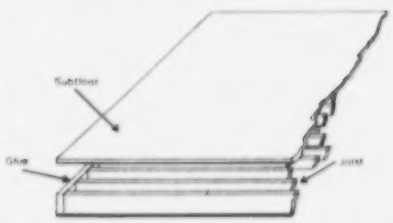
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 2-3 ACTIVITIES



FOLLOW THESE STEPS:

STEP 7: Attach the floor (plywood or cardboard) to joists and headers.



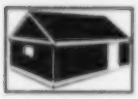
STEP 8: Place your name on the assembled floor.

STEP 9: Clean your area and place the floor in storage.

If you finish Days 2-3 Activities with time left over, you may begin Days 4-5 Activities.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 4-5 ACTIVITIES



On Days 4-5, complete the following activities:

1. Complete Objective 2

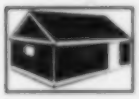
SUMMARY OF ACTIVITIES

Job Acquisition/Development Skills:

- Master specific job task/procedure

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 4-5
ACTIVITIES



OBJECTIVE 2

Use the materials and the procedure outlined below to construct the walls for your model home according to the specifications of the diagram for exterior walls.

TOOLS AND MATERIALS

- Architect's scale
- Pencil
- Floor plan
- Diagram for exterior walls
- Hot glue gun
- Single edge razor

and

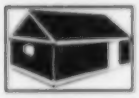
- Model kit

OR

- Miter box
- Band saw
- Scrap lumber

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 4-5 ACTIVITIES



PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Obtain the materials listed above.
NOTE: If you will be using a kit to construct your home, do not gather the lumber, miter box, or band saw. Skip to Step 3.

STEP 2: Ask your instructor if you may use the miter box and band saw to cut lumber into the following pieces (the number of pieces depends on the wall you construct):

- Wall studs
- Top and bottom plate
- Headers of varying lengths
- Trimmer, cripple and rough sill material

Measure the exterior wall diagram for the dimensions of the pieces you will cut.

WARNING:
MOVING BLADE can cut off hand or fingers. OBSERVE ALL SAFETY RULES AND KEEP SAW GUARDS IN PLACE.

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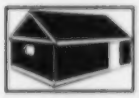
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 4-5 ACTIVITIES



FOLLOW THESE STEPS:

CAUTION:
BURN POSSIBLE. Glue is very hot.
DO NOT TOUCH HOT GLUE.

STEP 3: Plug the hot glue gun into a wall socket.

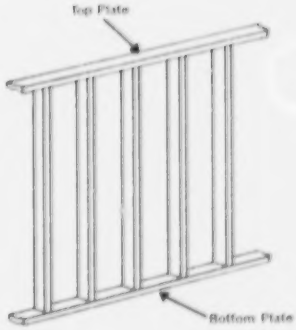
STEP 4: Layout the floor plan flat on a table.

STEP 5: Obtain the diagram of the wall section you are constructing.

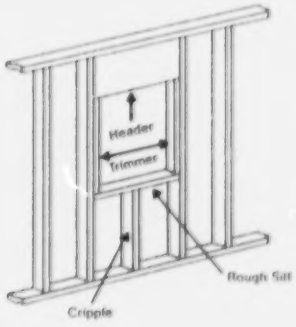
STEP 6: Use a pencil to mark off the stud location on the top and bottom plate.

STEP 7: Glue the cut pieces together using your marks on the top and bottom plates as guides.

IMPORTANT:
Do not glue on the wall diagram. Move the pieces onto the table for gluing.



STEP 8: After you assemble the wall sections, go back and put the header, trimmer, cripple, and rough sill in for windows and doors where required.



IMPORTANT:
You will also need to construct the T-assembly to join your walls according to the diagram T-assembly.

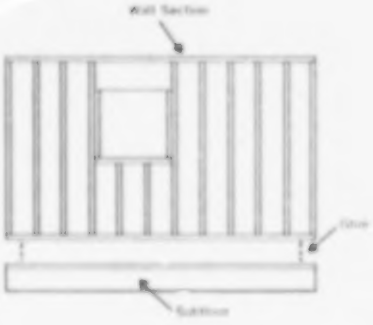
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 4-5 ACTIVITIES

FOLLOW THESE STEPS:

STEP 9: After you complete the construction of each exterior wall, ask your instructor to check your wall sections.

STEP 10: Glue the wall sections together on top of the subfloor.



STEP 11: Place your name on the walls you construct so they may be evaluated.

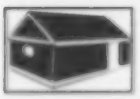
STEP 12: Carefully put your model in a safe place where your instructor may see it.

STEP 13: Clean your area.

If you finish Days 4-5 Activities with time left over, you may begin Days 6-7 Activities.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 6-7 ACTIVITIES



On Days 6-7, complete the following activities:

1. Complete Objective 3

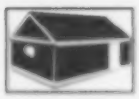
SUMMARY OF ACTIVITIES

Job Acquisition/Development Skills:

- Master specific job task/procedure

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 6-7
ACTIVITIES



OBJECTIVE 3

Use the materials and procedure outlined below to construct an interior wall for your model according to the specifications of the diagram for the interior wall provided.

TOOLS AND MATERIALS

- Architect's scale
- Pencil
- Floor plan
- Diagram of interior wall
- 2 T-assemblies
- Hot glue gun and glue
- Single edge razor blade

and

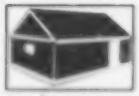
- Model kit

OR

- Miter box
- Band saw
- Scrap lumber

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 6-7 ACTIVITIES



PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Obtain the materials listed above.
NOTE: If you will be using a kit to construct your home, do not gather the lumber, miter box, or band saw. Skip to Step 3.

STEP 2: Ask your instructor if you may use the miter box and band saw to cut the lumber into the following pieces:

- studs
- headers
- trimmer
- double plate

Measure the interior wall diagram for the dimensions of the pieces you will cut.

WARNING:
MOVING BLADE can cut off hand or fingers. OBSERVE ALL SAFETY RULES AND KEEP SAW GUARDS IN PLACE.

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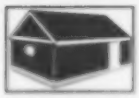
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 6-7 ACTIVITIES



FOLLOW THESE STEPS:

STEP 3: Plug the hot glue gun into a wall socket.

CAUTION:
BURN POSSIBLE. Glue is very hot. DO NOT TOUCH HOT GLUE.

STEP 4: Construct the interior wall of your model home using the same procedure you used to construct the exterior walls.

IMPORTANT:
The T-assembly is constructed differently from the corner assembly.

STEP 5: Mark the pieces as you have done in Objectives 1 and 2 and glue them together.

IMPORTANT:
Do not glue on the wall diagram. Move the pieces onto the table for gluing.

STEP 6: After you construct the interior wall to size, glue it into place according to the floor plan.

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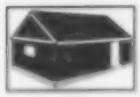
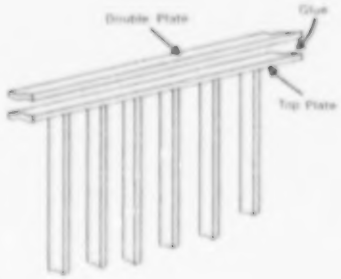
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 6-7 ACTIVITIES



FOLLOW THESE STEPS:

STEP 7: Install the double plate on top of the top plate. The top plate ties the walls together and adds strength to the structure.

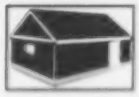


STEP 8: When you finish constructing the exterior walls, show your work to your instructor and clean your area.

If you finish Days 6-7 Activities with time left over, you may begin Days 8-9 Activities.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 8-9 ACTIVITIES



On Days 8-9, complete the following activities:

1. Complete Objective 4

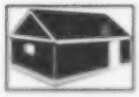
SUMMARY OF ACTIVITIES

Job Acquisition/Development Skills:

- Master specific job task/procedure

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 8-9 ACTIVITIES



OBJECTIVE 4

Use the materials and procedure outlined below to cut ceiling joists and rafters according to the diagram for ceiling joists and rafters.

TOOLS AND MATERIALS

- Architect's scale
- Pencil
- Diagram for ceiling joists and rafters
- Hot glue gun and glue
- Single-edge razor

and

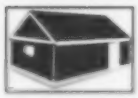
- Model kit

OR

- Miter box
- Band saw
- Scrap lumber

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 8-9 ACTIVITIES



PROCEDURE

FOLLOW THESE STEPS:

STEP 1: Obtain the materials listed above.
NOTE: If you will be using a kit to construct your home, do not gather the lumber, miter box, or band saw. Skip to Step 3.

STEP 2: Ask your instructor if you may use the miter box and band saw to cut the lumber into the following pieces:

- 15 ceiling joists
- 30 rafters
- 11 braces for top ridge (lengths may vary according to your model)

Measure the ceiling diagram for the dimensions of the pieces you will cut.

WARNING:
MOVING BLADE can cut off hand or fingers. OBSERVE ALL SAFETY RULES AND KEEP SAW GUARDS IN PLACE.

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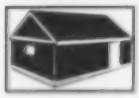
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 8-9 ACTIVITIES



FOLLOW THESE STEPS:

STEP 3: Plug the hot glue gun into a wall socket.

CAUTION:
BURN POSSIBLE. Glue is very hot. DO NOT TOUCH HOT GLUE.

STEP 4: Layout the diagram flat on a table.

STEP 5: Take one ceiling joist and use the pencil to mark the angle you will cut (make the mark on the joist itself).

STEP 6: Take two rafters and mark the angles you will cut.

STEP 7: Ask your instructor for permission to use the miter box to cut the angles on the pieces you marked in steps 5 and 6.

CAUTION:
SEVERE CUT POSSIBLE. Knife blade is very sharp. FOLLOW SAFETY RULES.

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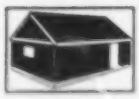
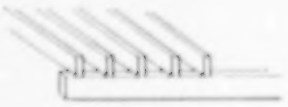
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 8-9 ACTIVITIES



FOLLOW THESE STEPS:

STEP 8: Put the pieces together to be sure they fit properly.



STEP 9: If the pieces in step 8 fit properly, then use those pieces as patterns to cut the other 14 joists pieces and 28 rafters.

STEP 10: Use the hot glue gun to glue the joists to the rafters as indicated in the roof framing diagram. Put your name on each rafter you construct so you can be given credit for it.

IMPORTANT:
Do not glue on the ceiling diagram. Move the pieces onto the table for gluing.

STEP 11: Ask your instructor to inspect the glued rafters and joists.

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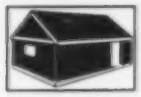
TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

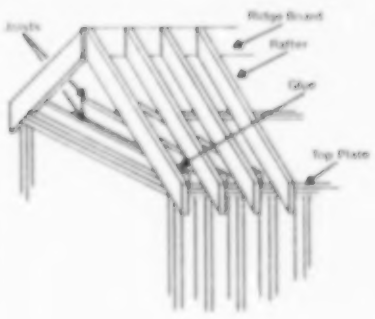
DAYS 8-9
ACTIVITIES



FOLLOW THESE STEPS:

STEP 12: Place marks 1" apart on the double plate of the model home along both sides of the long exterior walls.

STEP 13: Glue one of the assembled joists and rafters to the top plate flush with the outside of the two short exterior walls.



STEP 14: Gather the pieces you laid aside for the top ridge row bracing.

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TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAYS 8-9 ACTIVITIES

FOLLOW THESE STEPS:

STEP 15: Hold two rafters up so they look straight or perpendicular. Measure the distance between them at the top.

STEP 16: Cut the ridge row bracing pieces and cut a piece to the dimensions found in step 15.

STEP 17: Glue the ridge row bracing pieces between the rafters.

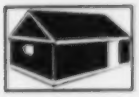
STEP 18: Repeat steps 15-17 until all the bracing is applied.

STEP 19: When you complete your roof frame, show your work to your instructor and clean your area.

If you finish Days 8-9 Activities with time left over, you may begin Day 10 Activities.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

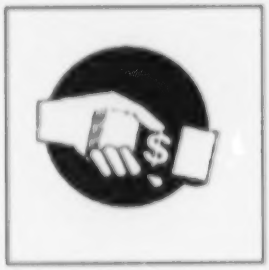
DAY 10 ACTIVITIES



On Day 10, Complete the following activities:

1. Complete Objective 5
2. Read Impact Statements
3. Complete Career Search Activity
4. Take Posttest

SUMMARY OF ACTIVITIES



Job Search/Selection Skills:

- Investigate requirements for a career field/occupation
- Compare/evaluate career options

Job Acquisition/Development Skills:

- Master specific job task/procedure

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 10
ACTIVITIES

OBJECTIVE 5

Use the materials and procedure outlined below to complete your model home and prepare it for final grading by your instructor.

TOOLS AND MATERIALS

- Single-edge razor
- Masking tape
- Ink pen

PROCEDURE

FOLLOW THESE STEPS:

CAUTION:
SEVERE CUT POSSIBLE. Blade is very sharp. FOLLOW SAFETY RULES.

STEP 1: Use the razor to gently trim any excess glue off your model home.

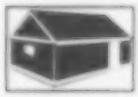
STEP 2: Place a 2" piece of masking tape on the table and both you and your partner write your names on the tape in ink.

STEP 3: Place the 2" piece of tape to your model where your instructor can see it easily.

STEP 4: Use the razor blade to scrape off any glue on the work table and clean up your area.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 10 ACTIVITIES



ENVIRONMENTAL IMPACT

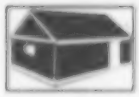
Residential construction has a direct impact on the environment in several ways. One way it impacts the environment involves the location of a home or residential housing division. Incorrect placement of residential housing can put homes and families in a flood plain where they are in danger of flooding during heavy rains. Placing residential structures in flood plains can also alter the flow of water in the plane so nearby structures may be endangered. If residential construction is not properly planned, it can also destroy a landscape by cutting down woods and forests or even by simply paving over fields of grass. Homes can be built to work with the environment rather than against it, but this takes careful consideration before construction.

SOCIAL/CULTURAL IMPACT

Residential construction can have a tremendous social impact for the residents of the finished homes. The first social impact of residential construction occurs within the home. Housing designs should allow families ample area to gather together and talk or play as a group, but those same designs should allow each family member a place to go for privacy.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 10 ACTIVITIES



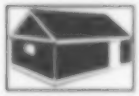
Residential construction can also have a social impact in the way one home relates to other homes in the neighborhood. For example, many residential housing divisions are designed to fit as many houses as possible in a small area and the residents tend to go outside the neighborhood to shop or recreate. But many designers plan divisions now so residents can shop and recreate within the neighborhood. This kind of design allows the residents to socialize with each other.

ECONOMIC IMPACT

Residential construction has economic impact on home buyers and home builders. Using expensive materials can make a home too costly to build if the people who would buy the home are not likely to have much money. Choosing good quality, inexpensive materials can allow you to build a good quality, affordable home for home buyers.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 10 ACTIVITIES



POLITICAL IMPACT

Residential construction can have political impact. Housing developers lobby local politicians to have land zoned for residential construction, or lobby to prevent businesses from building too close to a residential neighborhood. Also, good and bad residential construction can fuel debate about regulations and guidelines that govern construction quality standards.

ERGONOMIC IMPACT

Carpentry plays a special part in the ergonomic impact of residential construction. When the interior of a home is built ergonomically, residents can reach cabinets and closet spaces easily, have doors and windows that open and close easily, and have functional built-in features like bookcases and shelves. If any of these features are flawed, it makes living in the home more difficult.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

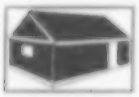
DAY 10
ACTIVITIES

CAREER SEARCH ACTIVITY
INSTRUCTIONS

Using *Career Search Abstracts*, find the occupations listed below. Select the two occupations that sound most appealing to you. On a separate sheet of notebook paper, list the two occupations you selected and tell why. Remember to write using complete sentences, proper grammar, and correct spelling. Give the completed sheets to your instructor.

RELATED CAREERS

- Carpenter
- Construction and Building Inspector
- Cost Estimator, Construction



CARPENTER

NATURE OF THE OCCUPATION

Carpenters use hand and power tools to construct, erect, install and repair structures made of wood products according to building codes.

Duties may include but are not limited to the following:

- Studying blueprints, sketches and building plans
- Ordering building materials
- Preparing materials to prescribed measurements using hand and power tools
- Assembling, fastening and installing materials
- Measuring dimensions and trueness of a structure to verify completed work
- Installing or replacing panes of glass, ceiling tiles, doors, cabinets and other furniture

OCCUPATION SPECIALTIES

Rough Carpenters (860.381-042) lay out and build frameworks for buildings, including window and door frames, partitions, sub-flooring and sheathing on outer walls and roofs. They also build concrete forms, scaffolds, platforms, screening fences and temporary shelters on the job site.

Finish Carpenters (860.381-022) lay out and install molding, baseboards, doorframes, doors, windows, paneling, cabinets, hardwood floors, stairs, partitions and other interior and exterior trim.

Maintenance Carpenters (860.281-010) construct and repair structural woodwork and equipment according to blueprints, drawings or instructions. They build, repair and install items such as counters, cabinets, benches, partitions, floors and doors.

WORKING CONDITIONS

Carpenters may work alone, with a helper, or with a crew. Some carpenters change employers each time they finish a construction job. Others alternate between working for a contractor and working as contractors themselves on small jobs.

Carpenters may work indoors or outdoors. Prolonged standing, climbing, and squatting often are necessary. Carpenters working indoors normally work 8 hours a day, 5 days a week. Carpenters working outdoors tend to work irregular hours due to weather conditions.

Carpenters may be required to purchase their own hand tools and safety equipment and generally provide their own clothes.

Carpenters may belong to a union such as the United Brotherhood of Carpenters and Joiners of America. Members usually pay periodic dues.

Tools, Equipment and Materials used may include:

- Hand & Power Tools
- Framing Squares, Rules & Calipers
- Plumb Bobs & Levels
- Pencil, Chalk & Marking Gauges
- Tape Measure
- Wood & Wood Products
- Welding Equipment
- Metal, Plastic & Concrete
- Nails, Screws, Tacks, Glue & Putty
- Blueprints

WORKER REQUIREMENTS

You should like:

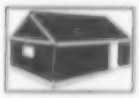
- Working with your hands
- Activities dealing with things, machines and techniques
- Working both independently and as part of a team

You should be able to:

- Work cooperatively with others
- Work within precise standards of accuracy

RESIDENTIAL CONSTRUCTION: CAREER SEARCH ABSTRACTS

DAY 10 ACTIVITIES



CARPENTER

- Recognize differences in the size, shape and form of lines, figures and objects
- Follow oral and written directions, plans and blueprints
- Use basic math procedures quickly and accurately

Physically you must:
- See well, either naturally or with correction
- Possess eye, hand and finger coordination
- Be able to use your fingers, hands and arms fully
- Be able to climb and maintain your balance on ladders and scaffolding
- Be able to stoop, kneel, crouch and/or transport objects weighing up to 50 pounds and occasionally more

Opportunities for Experience:

Summer or part time employment as a carpenter's helper and in co-op programs may be available through vocational centers, high schools or community colleges. All branches of the military service offer opportunities for experience.

Methods for Entry:

Methods of entering this occupation include direct application to employers; taking a civil service exam; or completing a formal apprenticeship program. Positions may also be located by consulting newspaper want ads, school placement offices, local unions or state employment offices.

EARNINGS AND ADVANCEMENT

Earnings depend upon type of work, union affiliation and geographic location.

Earnings:

Nationally in 1993, the average annual income for all carpenters was $22,927. Novice carpenters earned $21,773 annually, and experienced carpenters earned a yearly average of $27,545.

Maintenance carpenters employed in metropolitan areas earned an average salary of $33,194 annually. Yearly salaries are affected by bad weather conditions and availability of jobs.

Fringe Benefits:

Depending on the employer, carpenters may receive paid vacations and holidays; life, accident, disability and hospitalization insurance; retirement plans and sick pay. These benefits are usually paid for, at least in part, by employers.

Career Ladder for this Occupation may look like this:
- Contractor
- General Contractor
- Superintendent
- Supervisor
- Carpenter
- Apprentice/Trainee

Carpenters may advance through experience, occupational skill level and supervisory ability.

EMPLOYMENT AND OUTLOOK

There were approximately 1,077,000 carpenters employed nationally in 1990. Carpenters make up the largest group of building trades workers. Employment of carpenters is expected to increase as fast as the average for all occupations through the year 2005 due to increasing construction of new structures and alteration and maintenance of old ones.

Employment growth may be restricted because the increasing use of prefabricated components makes installation much faster and efficient than in the past. Carpenters with all-around training will have the best prospects.

Oklahoma Employment and Outlook

In Oklahoma, 231 job openings for carpenters are projected annually until the year 2000. These job openings represent new job growth as well as vacancies created by those leaving the occupation: promotions, retirements, etc. In 1990, carpenters held 5,285 jobs in Oklahoma. They are expected to hold 6,685 jobs by the year 2000.

RELATED EDUCATION AND TRAINING

Level(s) of education and training usually needed for this occupation:
- On the job training
- High school diploma with vocational education
- Technical, junior or community college
- Apprenticeship

School subjects helpful in preparing for this occupation include:
- Blueprint Reading
- Building Trades & Carpentry
- Applied Math
- Woodshop

MORE SOURCES OF INFORMATION
- Associated Builders & Contractors
  729 NW 15th St
  Washington, DC 20005
- Associated General Contractors of America
  Director, Construction Ed. Service
  1957 NW E St
  Washington, DC 20006
- Home Builders Institute
  15th and NW M St
  Washington, DC 20005
- United Brotherhood of Carpenters and Joiners
  Technical Director
  101 NW Constitution Ave
  Washington, DC 20001
- Carpenters' Local Union

RESIDENTIAL CONSTRUCTION: CAREER SEARCH ABSTRACTS

DAY 10 ACTIVITIES

CONSTRUCTION AND BUILDING INSPECTOR

NATURE OF THE OCCUPATION

Construction and building inspectors examine public and private construction projects to ensure compliance with building codes and ordinances, zoning regulations and contract specifications.

Duties may include but are not limited to the following:

- Inspecting buildings, dams, highways or bridges
- Inspecting wiring, fixtures, plumbing, sewer systems and fire sprinklers for safety
- Preparing reports concerning violations not corrected
- Interpreting blueprints and specifications
- Verifying levels, alignment and elevation of installations
- Reviewing requests for and issuing building permits

OCCUPATION SPECIALTIES

Building Inspectors
(168.167-030) make on-site inspections of new and existing buildings to enforce state and city building codes, zoning laws and approved standards.

Electrical Inspectors
(168.167-034) check electrical installations to verify safety laws and ordinances.

Plumbing Inspectors
(168.167-050) check plumbing installations for conformance to governmental codes, sanitation standards and construction specifications.

Construction Inspectors
(182.267-010) employed in the construction industry, examine and oversee the construction of bridges, dams, highways and other types of construction work to insure that procedures and materials comply with specifications.

Elevator Inspectors
(168.167-038) examine the safety of lifting and conveying devices such as elevators, escalators, ski lifts and amusement rides.

Mechanical Inspectors
(168.167-046) examine the installation of kitchen appliances, heating and air conditioning equipment and gasoline tanks to insure that they comply with safety standards.

WORKING CONDITIONS

Construction inspectors work under general supervision. They work closely with construction superintendents, engineers and skilled craft workers.

Construction inspectors spend about half their time in an office reviewing blueprints, writing reports and scheduling inspections. The rest of their time is spent traveling to construction sites.

The average workweek is 40 hours. Inspection work tends to be steady, year-round. Inspectors may spend a large portion of their time traveling and may be required to provide their own cars.

Tools, Equipment and Materials used may include:

- Ammeters
- Blueprints & Charts
- Federal, State & City Statute Books
- Reference Books
- Surveyor's Level & Transit Measuring Instruments
- Voltmeters

WORKER REQUIREMENTS

You should like:

- Activities of a scientific, technical nature

You should be able to:

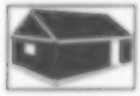
- Communicate and work well with people at all levels
- Use math accurately
- Picture three-dimensional objects from drawings and diagrams
- Keep detailed records

Physically you must:

- Maintain good vision and hearing, either naturally or with correction
- Reach, handle and finger objects
- Stand and walk for long periods
- Climb and maintain your balance while inspecting buildings

Special Requirements:

To become an inspector, several years of experience as a construction contractor, supervisor or skilled



CONSTRUCTION AND BUILDING INSPECTOR

worker is generally required. Inspectors must also have valid drivers' licenses.

Opportunities for Experience

Individuals wishing to explore the occupation may work as helpers to skilled craft workers. Part-time work may be available in small communities.

Methods for Entry

Apply directly to federal, state and local civil service offices. Jobs may be located by consulting college placement offices, newspaper want ads, and trade publications.

EARNINGS AND ADVANCEMENT

Earnings of inspectors depend upon job specialty, geographic location and amount and nature of an individual's work experience. Salaries are usually set by local governments according to civil service regulations.

Earnings

Nationally in 1993, the average earnings of first year construction inspectors were $24,967. Experienced inspectors earned average incomes of $32,537 and beyond, depending upon the employer and geographical location.

Inspectors employed by the federal government earned an average income of $31,280 in 1993.

Fringe Benefits

Fringe benefits received by inspectors may include paid holidays and vacations, sick leave, health, life, and disability insurance and a company car. These benefits are usually paid for, at least in part, by employers.

Career Ladder for this Occupation may look like this:

- Supervisor
- Chief Building Inspector
- Building Inspector
- Skilled Craft Worker
- Trainee

An engineering degree is often needed in order to advance to supervisory inspector. Advancement in government agencies is usually through competitive examination.

EMPLOYMENT AND OUTLOOK

There were approximately 60,000 construction and building inspectors employed nationally in 1990. Employment is expected to grow as fast as the average for all occupations through the year 2005. Increases in construction activity and concern for public safety should spur the demand for these occupations. Engineers, maintenance supervisors and construction managers are able to fulfill many of the duties of a construction inspector thereby limiting job opportunities. Best prospects are available for highly experienced craft workers who have some college training or who are certified.

Oklahoma Employment and Outlook

In Oklahoma 18 job openings for construction and building inspectors are projected annually until the year 2000. These job openings represent new job growth as well as vacancies created by those leaving the occupation: promotions, retirements, etc. In 1990, construction and building inspectors held 489 jobs in Oklahoma. They are expected to hold 547 jobs by the year 2000. This is considered an average growth rate.

RELATED EDUCATION AND TRAINING

Level(s) of education and training usually needed for this occupation:

- On-the-job training
- Technical, junior or community college

Level(s) of education and training also available for this occupation:

- College bachelor's degree

School subjects helpful in preparing for this occupation include:

- Blueprint Reading
- Building Trades & Carpentry
- Drafting
- Shop Math
- Woodshop

MORE SOURCES OF INFORMATION

- International Conference of Building Officials Seminar Department
  5360 Workman Mill Rd.
  Whittier, CA 2298

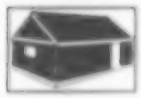
- National Conference of States on Building Codes and Standards
  505 Huntmar Dr., Ste. 210
  Herndon, VA 22070

- International Association of Electrical Inspectors
  901 Waterfall Way
  Richardson, TX 75080-6753

- International City Management Association
  1120 NW G St., Ste. 300
  Washington, DC 20005

- Home Builders Institute
  1090 NW Vermont Ave., Ste. 600
  Washington, DC 20005

- Southern Building Code Congress International
  900 Montclair Rd.
  Birmingham, AL 35213



COST ESTIMATOR, CONSTRUCTION

NATURE OF THE OCCUPATION

Cost estimators prepare cost estimates and analyze data for construction or manufacturing projects. They aid management in bidding on or in determining the cost or profitability of materials or services in manufacturing or construction. Cost estimators compile and analyze data on materials, labor, location and machinery.

Duties may include but are not limited to the following:

- Compiling lists of the type of materials, tools, fixtures or equipment required.
- Listing by item the tools, fixtures or equipment to be manufactured by the company or purchased from outside sources.
- Consulting with personnel or other departments relating to cost problems.

OCCUPATION SPECIALTIES

Contractors (182.167-010) perform specified construction work according to architects' plans, blueprints, codes and specifications, as well as estimating costs of material, labor and equipment.

Material Listers (229.387-010) review blueprint and material specifications to determine amount, size, kind, grade and place of delivery of materials for building construction projects.

Assistant Construction Superintendents (869.367-010) assist superiors in directing activities of workers on construction projects.

Paperboard Box Estimators (221.362-018) estimate cost of manufacturing paperboard boxes according to specifications and blueprints.

Printing Estimators (221.367-014) estimate labor and material costs of printing and binding books, pamphlets, periodicals and other printed matter, based on outlined specifications.

Jewelry Estimators (221.387-022) estimate the amount of material and labor required to produce particular types of jewelry.

Lumber Estimators (221.482-014) calculate the number of feet of lumber necessary to manufacture boxes and crates of specified size and number.

Yardage Estimators (221.484-010) compute amount of fabric needed to produce specified styles of garments in various sizes.

WORKING CONDITIONS

Although cost estimators spend most of their time in clean, comfortable, well-lit and well-ventilated offices, they must frequently visit construction sites that are dirty and cluttered or manufacturing facilities that are hot, noisy and dirty. They work under the pressure of deadlines and the need for accuracy. Their normal work week is 40 hours.

Tools, Equipment and Materials used may include:

- Computers
- Calculators and Adding Machines
- Catalogs
- Diagrams, Blueprints, Charts and Manufacturing Specifications
- Rate and Record Books
- Technical Tables

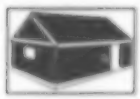
WORKER REQUIREMENTS

You should like:

- Activities of a scientific and technical nature
- Activities which involve the use of machines and processes
- Activities dealing with things and objects

You should be able to:

- Use reason and logic
- Communicate well in speech and writing
- Use mathematics quickly and accurately to determine costs
- Visualize flat drawings or pictures as solid objects
- See detail in objects or drawings and recognize slight differences in shapes or shadings
- Rate information using personal judgment
- Perform work accurately
- Rate information using measurable, verifiable standards
- See details and recognize errors in numbers, spelling, and punctuation in written materials, charts or tables



COST ESTIMATOR, CONSTRUCTION

Physically you must:
- Speak and hear well (either naturally or with correction)
- See well (either naturally or with correction)

Special Requirements:
Most construction cost estimators have experience as construction craftworkers or contractors. Those with experience and some postsecondary training in estimating, or with a bachelor's or associate's degree in civil or industrial engineering, accounting, finance, building construction or a related subject are more likely to find jobs than those with experience or education only.

Opportunities for Experience:
Secondary vocational education programs in accounting and computing may offer a co-op portion through which experience may be gained. This occupation may also be explored by obtaining related employment in construction and manufacturing firms.

Methods for Entry:
Methods of entering this occupation include direct application to employers and promotion from entry level jobs within construction and manufacturing firms. Assistance in locating a job may be obtained by consulting newspaper want ads.

EARNINGS AND ADVANCEMENT

The earnings of estimators may vary according to education, experience, amount of responsibility, geographic location, size and type of employer and whether they are paid a commission on sales, as in some construction companies.

Earnings:
Salaries for cost estimators vary widely by experience, education, size of firm and industry. Most starting salaries in the construction industry for those with limited training ranged from $24,902 in 1993. College graduates in fields such as engineering or construction management that provide a strong background in cost estimating started at $31,049 or more per year. Highly experienced individuals earned $35,902 or more. Starting salaries and annual earnings in the manufacturing sector were somewhat higher on the average.

Fringe Benefits:
Depending on the employer, most estimators receive paid vacations and holidays, life, accident and hospitalization insurance, retirement plans and sick pay. These benefits are usually paid for, at least in part, by employers. Some estimators also have a savings and stock investment plan. Some also receive cost of living allowances.

Career Ladder for this Occupation may look like this:
- Own Business
- Chief Cost Estimator
- Cost Estimator
- Qualified Craftworker or Contractor

Advancement for estimators is based on experience and the availability of job openings. Many estimators must have some experience in the industry in which they will work. They generally learn the technical knowledge needed to figure out costs accurately while working in other jobs.

EMPLOYMENT AND OUTLOOK

There were approximately 173,000 estimators employed nationally in 1990. Employment is expected to increase as fast as the average for all occupations through the year 2005. Most openings will occur as estimators leave the work force or transfer to other occupations. The level of employment will depend upon manufacturing, construction and government defense activity. Although residential construction is expected to decline, an increase is expected in the demand for multi-unit housing, commercial and industrial buildings and health related facilities.

Other areas of expansion include maintenance and repair, commercial and industrial renovation and hazardous waste.

Oklahoma Employment and Outlook
In Oklahoma, 81 job openings for cost estimators are projected annually until the year 2000. These job openings represent mostly new job growth, however, some openings are created as cost estimators leave the occupation, are promoted or retire. In 1990, cost estimators held 1,542 jobs in Oklahoma. They are expected to hold 2,175 jobs by the year 2000.

RELATED EDUCATION AND TRAINING

Level(s) of education and training usually needed for this occupation:
- On-the-job training
- Technical, junior or community college
- College bachelor's degree

School subjects helpful in preparing for this occupation include:
- College Preparatory
- Building Trades & Carpentry

MORE SOURCES OF INFORMATION

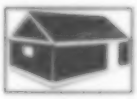
- National Estimating Society
  101 S. Whiting St., Ste. 313
  Alexandria, VA 22304

- American Society of Professional Estimators, Inc.
  11141 Georgia Ave., 412
  Wheaton, MD 20902-4637

- AACE International
  PO Box 1557
  Morgantown, WV 26507-1557

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

DAY 10 ACTIVITIES



POSTTEST

INSTRUCTIONS

You will need a computer scan sheet or card to record your answers to the following Posttest. Be sure to write your name, the title of the TLA, the date, and the class period on the computer scan sheet or card using a #2 pencil. Use rows 11-20 to record the answers to the Posttest. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers and number your answers 11-20.

SPELLING TEST INSTRUCTIONS

Use rows 21 - 30 on the test card. If the word is spelled correctly, mark (a) on the computer score sheet or card. If the word is spelled incorrectly, mark (b) on the test card. Be sure to use a #2 pencil and make your marks dark. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers and number your answers 21-30.

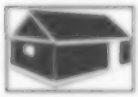
(a) correct (b) incorrect

Get Posttest Questions from your instructor.

If you complete Day 10 Activities with time left over, you may complete a Skunk Works Activity.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

SKUNK WORKS



BACKGROUND

The term *Skunk Works* comes from an engineering division of the 3M Company. In the late 1960s a group of engineers at 3M wanted to design a new product, but the managers of the company would not give them the time or money for research. So they decided to design the product anyway, then try to convince the company to market it. Whenever the engineers could grab a few extra minutes from their regular assignments, they worked on the new product. In early 1969 they presented it to the marketing division of 3M and the company has been selling it ever since. The product: Velcro fasteners.

SKUNK WORKS CHALLENGE

When architects design a home, they are responsible for providing several types of drawings. Some of these are:

elevations — drawings of homes as you would see them from different sides (front, left, right, and rear sides);

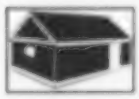
section view — this view shows the interior of a home. If you could slice a home in half from top to bottom and then pull the two halves apart, the resulting view of the interior is what a *section view* should show;

pictorial drawings — pictorial drawings attempt to show how a home will truly appear when it is complete;

plan view — this view shows the floor plans for each floor of a home.

TECHNOLOGY EDUCATION
RESIDENTIAL CONSTRUCTION

SKUNK WORKS



TOOLS AND MATERIALS

- Pencil
- Blank paper (2 sheets)
- Ruler

PROCEDURE

Imagine you are an architect asked to draw the floor plans for a single-story residential building. Create your own floor plans for this home on one of the sheets of blank paper. Indicate where doors and windows will be placed, what each room is (bedroom, living room, garage, etc.), and where fixtures such as toilets, sinks, cabinets, and countertops will be placed.

When you design your home, keep in mind the idea that the home should be functional (for example, all rooms must have a way in and out and all doors must be able to swing freely without obstruction) and ergonomic. Provide ample space for group and private activity. Indicate on your sheet how many people you think could comfortably live in your home.

OKLAHOMA
TSA